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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •

MARCH 3, 1934

Off to Measure Stratosphere Winds

See Page 137

A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXV *No. 673*

The Weekly Summary of Current Science

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SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

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DO YOU KNOW?

Sirup from Jerusalem artichokes may become a commercial article of diet.

There is a thousand times more silver than gold in solution in the oceans of the world.

Portable X-ray equipment is found useful in detecting the cause of lameness in valuable horses.

A Roman burying ground has been explored in France, near Blois, and more than 500 tombs opened.

No scientist has ever found a way of seeing through the clouds that always hide the planet Venus from the earth.

In a cemetery in France of the fourth century A.D., workmen found a stone sarcophagus containing a lead coffin, empty except for bottles of ancient "make-up."

Among the volcanic rocks in Hawaii National Park are rocks that float on water, rocks that can be heated and held in one's hand without injury, some that look like human hair, and some like wool fiber.

Less than two pounds of radium are available for use in the world today.

A 21-mile scenic highway is being built to the Norris Dam, near Knoxville, Tenn.

An adult Sierra Nevada shrew with a full stomach weighs scarcely one ounce.

A meter which measures the ultraviolet output of sunlamps has been developed.

An earthquake which shook Syrian Antioch in 115 A.D. is said to have caused the deaths of 250,000 people.

Sound motion pictures have just been introduced into Ethiopia, the first being shown before the Emperor and his court.

The Field Museum in Chicago has specimens of meteorites from more than two-thirds of all the meteorite falls known to science.

Statisticians figure that if a road is shortened by one mile, and about 500 vehicles a day use the route, the saving to these motorists is $12,500 a year.

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SURGERY
How thick is the cerebral cortex? p. 132.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but the references for further reading. Books cited can be supplied by Book Department, Science News Letter, at publishers' prices, prepaid in the United States.

GENERAL SCIENCE

Scientists Combat Contention That Science Destroys Jobs

Leaders, Armed With Facts, Show That New Industries Employ Many More People Than Old Ones They Replace

SCIENCE makes many more jobs than it destroys. Science has made our civilization and is not at the root of our economic and social ills.

This was the contention of leaders of science, including Drs. Karl T. Compton, R. A. Millikan and F. B. Jewett, all members of President Roosevelt's Science Advisory Board, who joined in condemning as "insidious" and dangerous to the nation the idea that science is to blame for unemployment and the depression.

America would be barred from rising to a higher level of living and we would suffer from industrial advances in foreign countries if NRA codes are allowed to stifle further technical improvements in manufacturing or if propaganda against science reduces support of scientific work, the scientific leaders made clear in a meeting arranged by the New York Electrical Society and the American Institute of Physics.

Dr. R. R. Millikan, of the California Institute of Technology, declared that labor-saving devices do not in general destroy jobs that demand intelligence.

"They cannot do it," he continued. "The heavy, grinding, routine, deadening jobs are the ones that machinery destroys. The progress of civilization consists primarily in the multiplication of human wants. If you want a stagnant civilization you have only to destroy the influences that cause these wants to multiply. . ."

Dr. Compton, president of the Massachusetts Institute of Technology and chairman of the SAB, stated that if 30 years ago there had been a successful attempt to restrain so-called "technological unemployment" in the carriage and wagon industry through legislation or codes that prevented the rise of the automobile, the source of income that now supports about 10,000,000 of our population would have been eliminated.

"Previous to the days of the automobile the 1900 census lists 976,000 individuals employed in the carriage and wagon industry, as manufacturers, drivers, draymen, livery stable managers, blacksmiths, etc.," Dr. Compton said. "Thirty years later, with the advent of the automobile, based on innumerable scientific discoveries and engineering developments, the census lists 2,405,000 individuals engaged in this industry, exclusive of those involved in oil production. These figures have been corrected to allow for the increase in general population in the same interval. They show that while the advent of the automobile produced technological unemployment among carriage and harness makers, yet the net result for labor has been a 250 per cent. increase in the number of jobs."

Dr. Compton combatted the widespread idea that use of labor-saving machinery on highways has thrown out of work any men who would otherwise be employed in road construction. The 20 years from 1910 to 1930, which witnessed development of most of the road-building labor-saving machinery, show an increase in the number of employees in road construction and repair from 203,000 to 339,000 individuals, with figures corrected for increase in general population.

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THE PRESIDENT'S LETTER

Dear Dr. Compton:

The value to civilization of scientific thought and research cannot be questioned. To realize its true worth, one has only to recall that human health, industry and culture have reached, in a century of progress, a far higher state than ever before.

The idea that science is responsible for the economic ills which the world has recently experienced can be questioned. It would be more accurate to say that the fruits of current scientific thought and development, properly directed, can help revive industry and markets for raw materials.

Very truly yours,

FRANKLIN D. ROOSEVELT.

PSYCHOLOGY

Children Learn Best at "Psychological Moments"

PSYCHOLOGICAL moments, or periods, occur in the life of each child at which time he can profit best from a certain type of instruction. Teaching him any skill or subject too early or too late means a waste of the child's energies and the instructor's. This was one of the points emphasized by Dr. Edgar A. Doll, of The Training School, Vineland, N. J., in an address before the Conference on Child Development, Care and Training held in Washington under the auspices of the Mooseheart Laboratory

ELECTRIFICATION

While some railroads build aluminum alloy, internal combustion-engined, streamlined train units, the Pennsylvania pushes to completion with recently acquired PWA funds the electrification of its main line from Wilmington, Del., to Washington. Plans call for employment on the project to increase to 6,000 men. The picture shows the kind of passenger express that is expected in 1935 to link the nation's capital with New York City. Already 72 such locomotives operate on 200 route miles.

for Child Research.

"We are only just beginning to realize that child development is an orderly procedure following a preordained pattern which is modifiable only within narrow limits by the forces of education," Dr. Doll said.

"The real problem of education is to capitalize these genetic periods, or psychological moments, of growth and development for instructional purposes. We are greatly confused in our instruction both at home and at school, and we waste our own energies as well as the child's by offering much instruction either too early or too late in his life. Moreover, we tax the child unduly by teaching before he has the capacity to learn, or we confuse him sadly by teaching him too late.

"One of the critical problems in the clinical psychology of childhood is the scientific determination of the child's abilities at any given time and the tendencies of his active development. These facts are needed to determine what kind and degree of instruction may be most practical and at what time and under what conditions this should be offered."

These "psychological moments" do not occur at the same age for each child, Dr. Doll explained, but probably the order of such development is similar.

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SURGERY

Functions of Brain Areas Revealed by New Technique

Surgeons Now Able to Make Layer by Layer Study Of Nerve Cells in Thin Outer Coat of Gray Matter

A NEW TOOL for physiological and brain surgeons the precision of which will surpass the keenest of scalpels and steadiest of hands was described by Dr. J. G. Dusser de Barenne, Sterling Professor of Physiology at the Yale School of Medicine. Speaking before the Association of Yale Alumni in Medicine, Dr. Dusser de Barenne explained the technique, devised by him, whereby any number of the consecutive layers of nerve cells in the cerebral cortex, the thin outer coat of gray matter of the brain, may be destroyed at will.

This method solves one of the difficulties long encountered in studies to determine the functions of the different areas of the cortex controlling bodily activities. Hitherto investigators have not been able to distinguish between the functions of the different layers because there has been no way of eliminating one or more layers selectively. The cerebral cortex consists of only six layers of nerve cells, except in the motor area where there are five.

"Laminar thermocoagulation of the cortex," brought about by the local application of moderate heat for a short period of time to the exposed surface of the brain, is the new technique announced by Dr. Dusser de Barenne. The depth to which the tissue is killed depends upon the temperature and the length of time heat is applied.

It was found that heating to between 90 and 100 degrees Centigrade for five seconds results in death of all the nerve cells in the heated area throughout the whole thickness of the cortex. By heating to about 70 degrees Centigrade from one to two seconds, it is possible to kill the nerve cells of only two layers.

As an example of results which can be obtained by the new method in determining the functions of the different layers of the cortex, Dr. Dusser de Barenne said that he had found that the movements obtainable on electrical stimulation of the motor cortex are due to direct stimulation of the two inner layers and in all probability to the direct stimulation of the large nerve cells of the fourth layer.

Microscopic studies reveal that this method of destroying a predetermined number of layers of nerve cells over a large or small area does not damage the immediately adjoining cortex, and that the dead tissue is resorbed within a few months without leaving any scar or distortion. This new method of nerve cell destruction is expected to prove useful in human brain surgery in special cases such as cortical focal epilepsy, in which a sharply localized extirpation of part of the cortex is necessary.

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PSYCHOLOGY

Occupation Sampling Suggested to the Young

THE PROBLEM of assisting graduates of an organization such as Mooseheart to place themselves vocationally is much more difficult in the modern economic world, Dr. C. A. Prosser, of the William Hood Dunwoody Institute, warned officials of the Mooseheart Laboratory for Child Research at the Conference on Child Development, Care and Training held in Washington.

The young person today should not be crammed with useless facts, soon obsolete, about occupations, Dr. Prosser said. He should be put through experiences in sampling and exploring occupations; in the testing of his own likes and dislikes among occupations; in the further study of the occupation or occupations in which he is especially interested; in the investigation of the occupation to find whether it is a desirable one to follow; in checking his own qualifications against the requirements for success in the occupation; in finally choosing an occupation to follow; in selecting a suitable employer for that occupation; in applying for a job; and in selling his services to an employer.

"All this constitutes what is here called, for want of a better name, developing the technique of vocational adjustment—of looking after yourself in this matter of employment," Dr. Prosser said. "Like all other technique, it cannot be developed by preachment or suggestion or fact peddling but only through directed practice in thinking and doing with the aid of usable facts."

Science News Letter, March 3, 1934

▼ RADIO ▲

NEW CROPS FOR THE AMERICAN SAHARA

an address by

Dr. W. T. Swingle

Of the Bureau of Plant Industry, U. S. Department of Agriculture

Wednesday, March 7, at 4:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

WAR SOUVENIR

This is the x-ray picture that revealed the knife blade, white streak in upper left corner, in Mr. Sherry's brain.

MEDICINE

Lameness Traced to Knife Blade in Brain

FOR OVER fifteen years James P. Sherry of Rochester, N. Y., carried a knife blade buried in his brain without knowing it.

Recently, severe headaches and lameness in one leg led him to seek medical aid. Dr. Charles S. Gallaher, of the medical department of the Eastman Kodak Company where Mr. Sherry is employed, examined the man, detected an abnormal condition of the eye on the side opposite to the lame leg, suspected a brain abscess and took an X-ray picture, which showed the knife blade in Mr. Sherry's brain. A fine scar was then found on his scalp. Removal of the blade by surgical operation resulted in the patient's complete recovery.

Strangely enough, Mr. Sherry was not only ignorant of the blade's being in his brain, he did not even remember ever suffering a head injury. The only possible explanation is that the blade entered his brain at the time of a war injury. Mr. Sherry was struck on the elbow by shrapnel in the Argonne. For hours afterward he was dazed. Mr. Sherry and his medical attendants believe that the knife blade was in the same shell and was driven through the skull by the same burst, probably going in red hot and cauterizing the wound it made.

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CHEMISTRY

First Chemical Proof Obtained For Artificial Transmutation

Reaction Shows That One Element Turns Into Another; Three New Radio-Elements Now Introduced to World

THE FIRST chemical proof of the artificial transmutation of the elements has been obtained by M. and Mme. F. Joliot, working at Mme. Curie's famous Institute of Radium in Paris. Mme. Joliot in her scientific work uses her maiden name, "Irene Curie." She is the daughter of Mme. Curie.

This achievement came as the result of the Joliots' discovery a few weeks ago of artificial radioactivity. Alpha particles or helium atom hearts from naturally radioactive polonium, when flung at aluminum, boron and magnesium, resulted in emissions of positrons even after the bombardment was stopped. In the case of boron the activity continued for nearly 15 minutes. This was hailed as an important step in understanding the structure of the atom.

The positron is the recently discovered positive electron, now considered one of the ultimate particles of matter.

The theory of the mechanism of the artificial radioactivity is that the helium atom combines with a boron atom forming a nitrogen atom which is unstable and disintegrates into a stable carbon atom with the emission of a positron.

The Joliots used a strong radioactive source and succeeded in getting about 100,000 atoms of the artificially radioactive element, which is nitrogen in the case of the attack on boron. This may seem to be a large number of atoms but it is a very small amount of material upon which to perform a chemical experiment. And they had to work fast in order to complete the reactions before the activity disappeared.

They irradiated a small amount of the chemical compound, boron nitride. They then produced ammonia gas by heating this activated boron nitride with caustic soda. Tests upon the ammonia showed that it was unusual. The artificial radioactivity had forsaken the boron and had traveled away with the ammonia. This was proof that the radioactive element formed is nitrogen. Similar experiments were performed with aluminum by dissolving irradiated aluminum in hydrochloric acid and finding that the activity is carried away with hydrogen gas that can be collected.

Here was chemical proof of transmutation, one element turning into another, the modern realization of the old dream of the alchemists. It was good proof also that the helium heart or alpha particle is captured in these reactions.

Three new kinds of chemical elements can now be introduced to the world. The unstable, radioactive forms of nitrogen, silicon and phosphorus made in the transmutation of boron, magnesium and aluminum are the new radio-elements. The Joliots propose special names for them: radionitrogen, radiosilicium, radiophosphorus.

They suggest that these new elements and others similar to them will be formed when physicists try other experiments in atomic rearrangements with the aid of atomic projectiles. For instance, radionitrogen might be formed if an ordinary carbon atom captured a deuton, and this event would be followed by the emission of a neutron. The deuton is the nucleus or heart of heavyweight hydrogen (deuterium) while the neutron is the electrically neutral particle which is about as heavy as a hydrogen atom. It is probable that this suggestion will be tested at Berkeley or Pasadena, Calif., where experiments with deutons have been very successful.

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ASTROPHYSICS

Greatest Sun Heat Set At 21 Million Degrees

TEMPERATURE of the sun: Average —12,000,000 degrees. Maximum—21,000,000 degrees. These figures are on the Centigrade scale used by scientist.

This is the latest solar heat report announced by Sir Arthur S. Eddington, the British astronomer-physicist, as the result of calculation made according to the latest theory.

These high temperatures represent a reduction from the 1924 Eddington esti-

mate which was 40,000,000 degrees.

The number of atoms in the sun is 1,000,000,000,000,000,000,000,000 (ten to the 24th power) and the number of free electrons is at least as great.

The number of X-rays which constitute the internal radiant heat of the sun, total 20,600,000,000,000,000,000,000 (20,600 times ten to the 18th power). Sir Arthur believes that this number is correct within one per cent.

These X-rays are continually absorbed by the atoms and are emitted again and again. Thus energy is conserved and the sun has a long expectation of life.

Sir Arthur considers that it is possible that the sun consists of as much as 99.5 per cent. hydrogen but that a content of 35 per cent. is more probable. The recognition that a large proportion of hydrogen exists in the stars is considered by Sir Arthur to be the most important advance in stellar theory in the last seven years.

As to whether the sun or man-made high voltage can do the most damage to atoms, Sir Arthur is backing the high voltage developments now in progress of which the apparatus at Cambridge's Cavendish Laboratory is typical.

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GEOLOGY

Yellowstone Park Has Great New Hot Pool

YELLOWSTONE National Park has a new pool, located in Midway Geyser Basin. Ranger Frank Child passed through the region late in January, and saw nothing unusual. But when he returned during the following week, the pool was there, about forty feet in diameter.

In being born it caused the dislocation of several tons of rock. Some of the dislocated rocks, now thirty feet distant from the pool, are estimated to weigh more than 600 pounds.

The new pool is very hot and very muddy. Violent boiling occasionally takes place on the north side. When this occurs a slight shock can be felt several feet from the edge.

It is located just east of the Black Diamond pool, from which it is separated by a narrow ledge of rock. The Black Diamond is about fourteen inches above the level of the new pool. A small stream of water flows from it to the new pool, and from the latter a stream six times as large in volume is flowing into the river.

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PHYSICS

Americans Propose Theory Of Electron and Positron

A THEORY is a mere theory until something that it predicts actually happens. Because Prof. P. A. M. Dirac of Cambridge University, England, evolved a theory of the electron that foretold the existence of the positive electron (positron) which was discovered in cosmic ray crashes by Dr. Carl D. Anderson of Pasadena about 18 months ago, the Dirac formal mathematical symbolism received the intellectual homage of scientists. Incidentally, Prof. Dirac himself shared the Nobel prize for 1933.

Now, two Americans have offered a radically new theory of the electron and positron which goes beyond the Dirac theory and makes more predictions which scientists will proceed to test. Dr. W. H. Furry, a National Research Fellow, and Prof. J. R. Oppenheimer of the University of California present their theory in *Physical Review*, publication of the American Institute of Physics.

One consequence of the Furry-Oppenheimer theory is reminiscent of the famous Heisenberg principle of uncertainty. Roughly, that idea was that it was impossible to know just where a particle was and at the same time know just how fast it was going. The new theory states that the total energy of a system of particles in the presence of an external electro-magnetic field and the total charge and current density of such a system may be determined. But this can be done only at the expense of a precise knowledge of the number of electrons and positrons that are present in the system.

This means that the scientists can not determine with absolute precision the exact spot where cosmic or gamma rays create a pair of electrons. And this is something that scientists have wanted very much to know ever since Dr. Anderson's discovery of positron-electron twins born of cosmic ray smashes into matter.

Due to this necessarily incomplete knowledge, the physicists are forced to conclude that this creation of matter from energy, if such it be, occurs outside the nuclei of atoms. The intense electric fields of the nuclei have little to do with energy-into-matter conversion, if the theory is correct.

One prediction of the new theory can be submitted to experimental checking. It is that if protons (hydrogen nuclei) are shot through an atmosphere of other protons they will suffer a scattering that differs from that which would be predicted by the old and usually reliable Coulomb law that "force is inversely proportional to the square of the distance between electrically charged particles." If this proves to be the case, the new theory will have gone through its first fire.

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BIOLOGY

House Bill Restores Cuts in Research

FOUR IMPORTANT research activities in the Bureau of Biological Survery, which the Budget Bureau had scheduled for annihilation in 1934-35, have been restored in the Agricultural Department Appropriation bill reported to the House.

These are (1) Research on the food habits of birds and animals; (2) Migratory bird investigations; (3) Research on control methods for predatory animals; and (4) Researches on the production of fur-bearing animals.

Restoration of these items in the bill has added a total of $142,803 for these lines of work.

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HISTORY OF SCIENCE

CWA Worker Finds Copy Of "The New World"

A CWA worker, a library helper, has just brought to light an extremely rare and valuable work on America's discovery. It is a book written within twenty years after Columbus' death, printed in beautiful German type and bound in a wood cover shod with tooled leather.

It belongs to the Smithsonian Institution at Washington. Only two other copies are known to exist, and these also

belong to America, to libraries in Providence, R. I., and New York City. The volume, titled "The New World" and printed in Strassburg in 1534, is said to be almost unknown to research scholars.

English translation of the German work has been begun by Herbert Krieger, ethnologist of the Smithsonian staff. The German book is itself a translation of a work by Jean Huttich which appeared first in Latin two years earlier. When this new Latin volume, telling about the voyages of Columbus and other explorers appeared in 1532, it so interested the German, Michael Herr, that he had his friends read the Latin to him on winter evenings, and he wrote a German translation. Herr was a faithful and scholarly writer, with a pleasing German style, Mr. Krieger finds. His account checks well with known authorities on American exploration.

Herr describes Columbus as "a brave, big man with a long, red, freckled face" —not a heroic description, but one with a truthful ring. Herr gave more space than most historians to the cannibals of the New World, and to the island of women, Mr. Krieger has observed. The cannibals that Columbus met were Carib Indians, who were accustomed to swooping down on peaceful Arawak Indian farmers and carrying off victims for a feast. The island of women is thought to be Martinique. It was a sort of prison island where the Caribs held their captives for various purposes.

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BRAVE, FRECKLED COLUMBUS

That is the description given by the rare volume in the young CWA worker's hands.

ASTRONOMY

200-Inch Telescope Mirror To be Coated With Aluminum

Unique Bombardment With Hearts of Matter Will Clean Quartz to Receive Layer of Best Light Reflecting Metal

THE GREAT 200-inch telescope now being planned at Pasadena will be coated with an aluminum layer of high reflecting power instead of the silver that has been the standard material for many decades. The process for making such high quality mirror surfaces has been sought a long time but satisfactory results have been obtained only recently through experiments of Dr. J. Strong of the California Institute of Technology.

The first important trick involved is to get the surface to be vapor plated really clean. What is clean enough for silver plating is by no means satisfactory for aluminum. Dr. Strong blasts off the final contamination by a bombardment with electrons and ions.

The next puzzle was to find a suitable way of getting the aluminum to go where it was required. This is done by melting the aluminum on a tungsten wire of just the right size and shape. If the wire is too fine the molten aluminum will dissolve it and burn out. The wire in the form of a helix is heated until the aluminum evaporates and deposits on cooler surfaces nearby. This requires that the process take place in a high vacuum.

Dr. Strong has coated many small mirrors for instruments at the Mt. Wilson Observatory with great success. Aluminum has an enormous advantage in reflecting ultraviolet light. Silver and everything else so far used are very poor as reflectors in comparison. Because of silver's shortcomings, the reflecting type telescope was inefficient. Aluminum will reflect well all the light that gets through the atmosphere.

The aluminum coating can be "laundered." The aluminum surface develops an invisible coat of aluminum oxide which protects the metal without tarnishing like silver. It can be washed over and over with soap and water. It is thus not only much better but much more durable than silver which is now commonly used.

The biggest mirror so far coated is the 36-inch reflector of the University of California's Lick Observatory on Mt. Hamilton, Calif. The coating was applied by Dr. Strong. It required a vacuum chamber big enough for several people to sit in. The chamber for the 200-inch diameter mirror (almost 17 feet across) will be gigantic by comparison but only technical difficulties are involved in its construction.

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ECONOMIC ZOOLOGY

Mink and Silver Fox Farms Show Profit

FUR-FARMING — domestic cultivation of the silver fox and mink—has been on a fairly profitable basis for the past three years, reports F. G. Ashbrook of the Bureau of Biological Survey, U. S. Department of Agriculture. The Biological Survey is maintaining experimental fur farms, although its appropriations for the purpose are limited.

The stock-promotion phase of the fur-farming industry has now passed into Limbo, Mr. Ashbrook holds.

"It has been, during the last three years," I believe, "the one livestock enterprise that has actually given a profit," he said.

Fur farmers harvested 150,000 silver fox and 50,000 mink skins in 1933. The largest problem is to improve the pelts. Too many of them are inferior.

About thirty to thirty-five million dollars is invested in equipment and animals, buildings and runways.

Rabbit breeding is also conducted to a large extent on small farms, but largely for the purpose of selling the meat.

The fur trade uses more than 100,000,000 rabbit skins annually, but 98 per cent. of these come from Australia, New Zealand, Belgium, France, and other foreign countries.

The Congressional committee on appropriations restored $51,717, which had been eliminated by the Budget Bureau, in order to have work on experimental fur farms continue.

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MARINE BIOLOGY

"Porcupine" of Sea Found off Florida

A VERITABLE porcupine of the sea, a giant sea urchin with spines a foot long, has been given scientific description for the first time by Austin H. Clark, curator of echinoderms at the U. S. National Museum. The creature is believed to be the biggest sea urchin known from any part of the Atlantic ocean.

The giant sea urchin was discovered by Dr. P. Powers of the Carnegie Institution of Washington, in the shallow waters around the Dry Tortugas islands, off the southern tip of the Florida peninsula. He sent it to the National Museum for examination, and Mr. Clark discovered that it is a new species. He has given it the scientific name *Astropyga magnifica.*

The round body of the sea urchin is about six inches in diameter. It is covered with hundreds of foot-long, barbed black spines. Among their bases are about 200 bright blue eye-spots arranged in rows. These appear to be true sight organs, for when anything moves in front of them the long spines are kept pointed menacingly at it. The formidable armament, however, is strictly defensive; the sea urchin cannot "shoot" its spines or in any other way assume the initiative in attacking.

Science News Letter, March 3, 1934

PHYSIOLOGY—PHYSICS

Heavy Water Makes Mouse Act Strangely

HEAVY water, made with double-weight hydrogen atoms instead of the ordinary single-weight ones, failed to kill a mouse to which it was administered with a dropper, but did cause the animal to act very strangely, as if temporarily poisoned. This was the outcome of the first experiment tried with a warm-blooded animal, in the laboratory of Prof. Gilbert N. Lewis of the University of California, as reported to *Science.*

Prof. Lewis chose three mice of "respectable ancestry." To one of them he administered the heavy water, drop by drop because it is so costly. To the other two he gave ordinary water; these mice served as experimental "controls." The two "control" mice behaved normally, dividing their time between eating and sleeping, the one that got the heavy water did neither, but persistently leaped about, and for some mysterious reason licked at the glass walls of his cage.

"The more he drank of the heavy water the thirstier he became," reports Prof. Lewis. "He would probably have drunk much more if our supply of heavy water had not given out."

Yet in spite of his evident distress the mouse recovered.

Prof. Lewis and his associates discovered some time ago that tobacco seeds immersed in heavy water failed to germinate. When the experiment was repeated, and the seeds transferred to ordinary water after a period of soaking in heavy water, some of them did sprout, but their growth was freakish and short-lived. Part of a batch of flatworms, apparently killed by immersion in heavy water, similarly revived in ordinary water.

In his report, Prof. Lewis discusses possible biochemical reasons for the deadliness of heavy water, but withholds definite conclusions pending further experimentation.

Science News Letter, March 3, 1934

PSYCHOLOGY

Minds of Premature Babies Develop Normally

THE MENTAL development of babies born prematurely, sometimes called "midget" babies because of their small size at birth, goes along at the same rate as in their brothers and sisters who were born at full term. Evidence of this was obtained in a study reported by Dr. George J. Mohr of the Pittsburgh Child Guidance Center and Dr. Phyllis Bartelme of the Chicago Institute for Juvenile Research to the American Orthopsychiatric Association.

Two hundred and fifty prematurely born white children were studied and compared with 150 of their brothers and sisters who had been born at term. Both physical and mental growth were studied. The brain and nervous system were apparently not affected by premature birth, but heart, blood vessels and digestive system were found seriously affected. Such changes as were found in the brain and nerves were results of weakness of the heart and blood vessels.

Weight of the babies at birth apparently had nothing to do with their mental development, although it was a factor in their physical development, particularly among the boys.

Science News Letter, March 3, 1934

IN SCIENC

CHEMISTRY

Research Aids Beer And Wine Industries

LABORATORIES of the bureau of chemistry, U. S. Department of Agriculture, will shortly be at work on problems of wine making and liquor distillation.

Dr. Henry G. Knight, chief of the bureau, recently told House members of the subcommittee on appropriations for the Department of Agriculture that this "is a field we are giving consideration to at the present time. . . Recently we have done a little work in connection with citrus fruits or in the manufacture of beverages from citrus fruits. We have made a very satisfactory wine out of oranges and certain other citrus fruits."

Liquor manufacture is a very profitable field for research, Dr. Knight said. Quality of yeast, types of fermentation, are very important in the brewing and fermenting industries, and accuracy in their use determines the liquor or brew which is produced.

Dr. Knight told the congressmen of a brewery which formerly had worked up a large sale for a certain type of beer made with a certain yeast which they had found. This yeast was accidentally lost. They have been hunting for it ever since. In the meantime, that particular beer has gone out of existence.

Science News Letter, March 3, 1934

SEISMOLOGY

Quake Shakes Sea Bottom Among Japanese Islands

JAPANESE mandated islands in the Pacific may have felt the force of an earthquake which occurred early on Saturday morning, Feb. 24, and was traced to its epicenter by seismologists of the U. S. Coast and Geodetic Survey, using data gathered telegraphically by Science Service.

The approximate location of the epicenter was between the Bonin and Marianne islands, in latitude 22 degrees north, longitude 145 degrees east. The quake began at 1:23.6 a. m., E. S. T.

Science News Letter, March 3, 1934

NCE FIELDS

METEOROLOGY

Unstable Air Structure Cause of Tornadoes

WINTER tornadoes, such as the storms that took two score of lives in the South on Sunday afternoon, Feb. 25, are unusual only in the season of their occurrence, scientists of the U. S. Weather Bureau told Science Service. The basic physical causes that bring tornadoes into existence are the same, whatever the season.

The state of great atmospheric instability that can start these intense twisting air-whirls is set up most commonly by the inflow of a cold air mass at a relatively high level—6,000 to 15,000 feet—riding over a mass of warm air that hugs the ground. Such an extensive "temperature inversion" is an invitation to the two air masses to mix and overturn—and if the overturning is rapid enough, swirls of tornadic force are the result.

Science News Letter, March 3, 193.

METEOROLOGY

164-Mile Wind Blows On Mt. Washington

See Front Cover

RECENT calibration and test of instruments reveal that a true wind velocity of 164 miles per hour has been recorded on the top of Mt. Washington during the present occupation of the peak as a meteorological observatory. Examination of records at the U. S. Weather Bureau at Washington, D. C., show that this is an unusually high figure in the history of weather observation.

A reading of 186 miles per hour was made on Mt. Washington on Jan. 11, 1878, with a hand anemometer which was held out of a window, C. F. Talman of the Weather Bureau states. Since anemometers of that day ordinarily read high, yet this one was not held in a well exposed location, it reading has been accepted. It is a coincidence that exactly the same velocity was observed by pilot balloon sent up at Lansing, Mich., on Dec. 17, 1919.

Equally high and even higher wind velocities are known to occur in tornadoes and tropical storms, but seldom does a record come through the destruction. A 164-mile per hour reading was reported from Nassau during a 1929 hurricane.

The present Mt. Washington record was originally reported as 152 miles per hour, but the figure was altered by wind tunnel tests on the anemometer after it had been brought down from the mountain. The readings were taken between three and four a. m. last April 5.

The front cover picture of this week's SCIENCE NEWS LETTER strikingly pictures the method of measuring wind velocity high above the top of the mountain. A pilot balloon has just been released and will be followed with the theodolite as long as it can be seen.

Since the winter of 1932-33 was very mild, while the current season has been extremely severe in the East, Mt. Washington may soon be reporting greater velocities than the 164 mile per hour figure.

Science News Letter, March 3, 1934

CHEMISTRY

Alcohol-Blended Gasoline Discussed by Congressmen

ALCOHOL blended with gasoline is not completely satisfactory when used as a motor fuel, Dr. R. W. Skinner, asisstant chief of chemical and technological research, reported to congressmen comprising the subcommittee of the House committee on appropriations for the Department of Agriculture.

There are both technical difficulties and operating difficulties, he elaborated. (*See SNL, June* 17, '33, *p.* 380, *May* 13, *p.* 301, *Feb.* 25, *p.* 116). The mileage obtained from a gallon of such fuel is less than that obtained from straight gas. Depending upon the proportion of alcohol used, there may or may not be a decrease in power. There are technical difficulties in the way of preparing alcohol from corn which can be used in such a mixture.

Engines built for straight gas, however, are not a fair test of the use of alcohol as motor fuel. Engines in which alcohol mixtures are to be used should have higher compression.

Of the advantages in using alcohol, he said, one is that it gives the fuel better anti-knock properties than straight gas would have.

Science News Letter, March 3, 1934

PUBLIC HEALTH

No Rickets in Puerto Rico But Children Starving

ALTHOUGH the majority of children in Puetro Rico are greatly undernourished, some even to the point of starvation, hardly any of them have rickets, U. S. Children's Bureau investigators found.

They state that of 584 children under three years whom they examined, only five children had definite rickets. One of these showed scars of rickets which she had while living in New York City. Another was an infant who had lived most of her life in the cellar of a large stone tenement lighted only by electric light.

The absence of rickets in these children, in spite of their poor state of nourishment, is considered due to the fact that they spend most of their time in the tropical sunshine. The ultraviolet rays of the sunshine act on a fatty substance in the skin to form rickets-preventing vitamin D. In the North, where there is little sunshine, and where the ultraviolet rays do not strike with full intensity, rickets is a very common complaint. To prevent it, vitamin D is given in cod liver oil.

Even with cod liver oil, however, children of New Haven, Conn., who were examined by child specialists of the U. S. Children's Bureau were found suffering from slight rickets. Because of this finding, the study of the Puerto Rican children was made. The condition is actually very rare in Puerto Rico as compared with New Haven, it appears from the survey.

Science News Letter, March 3, 1934

AGRICULTURE

Copper Sulphate Speeds Truck Crop Production

COPPER sulphate (blue vitriol), usually considered a poison to plants, is good for certain crops in certain soils, R. Russell and Dr. T. F. Manns discovered in experiments in the truck-garden area near Newark, Del. They reported on their experiments before an audience of plant physiologists at the meeting of the American Association for the Advancement of Science.

Corn, potatoes, sweet potatoes and string beans were among the crops that responded favorably to copper sulphate fertilizer.

Science News Letter, March 3, 1934

ASTRONOMY

Spring is Coming

Astronomically, at Least, Seasons Change on Wednesday, March 21, When the Sun is Directly Over the Equator

By JAMES STOKLEY

ONLY ONE planet is to be seen in the evening sky this month. That is Jupiter, now brightest object in the heavens at night, appearing low in the east just above the bright star Spica in the constellation of Virgo, the virgin. A little higher in the sky and farther to the north is Arcturus, in Bootes, a star of which we heard much last summer, when its light after traveling 40 years was used to start the illumination of the Chicago Century of Progress Exposition.

High in the eastern sky is the "sickle," a group of stars resembling that implement with the star Regulus at the end of the handle, which points southwards. This is part of Leo, the lion, the blade of the sickle forming the animal's head. To the northeast is the "great dipper," with its handle hanging down.

Orion, the giant warrior, is over to the southwest. Above the three stars that form his belt is the brilliant Betelgeuse and below them is Rigel. Farther to the south is Sirius, in Canis Major, the greater of the two dogs that accompany Orion. Sirius is often called the "dog star." It is the brightest star in the sky, though it is not quite as brilliant as the planet Jupiter. Above is the lesser dog, Canis Minor, with the star Procyon.

The Twins Overhead

The twins, Gemini, are almost overhead. Castor and Pollux are their names, the latter, to the south, being the brighter.

Directly west is a red star, Aldebaran, in Taurus, the bull. This forms the eye of the beast and is part of a V-shaped group, called the Hyades, which represent its face. The Pleiades, the famous "seven sisters" are a little to the north. In the northwest shines Capella, part of Auriga, the charioteer. Cassiopeia, shaped like a W on its side, is low in the sky and almost to the north.

The maps represent the March skies as they appear about 10 p. m. on the first of the month, 9 p. m. on the 15th, and 8 p. m. on the 30th.

Perhaps the most welcome astronomical event brought by the month of March is the beginning of spring. Last December the sun was well south in the skies, but since that date it has been moving northwards. This month it is in the constellation of Pisces, the fishes, a group which could be seen in the evening skies but a few months ago.

If it were not for the earth's atmosphere, which gives the sky its blue color, we could now see these stars close to the sun, but the great glare of that body as diffused in the layer of air that surrounds our planet, hides all the stars from view in the daytime sky though they are there just as much as they are in the sky at night. If we lived on a planet like Mercury, or on the moon, bodies which have no atmosphere, we might be able to see the stars in the daytime sky.

Once Beginning of Year

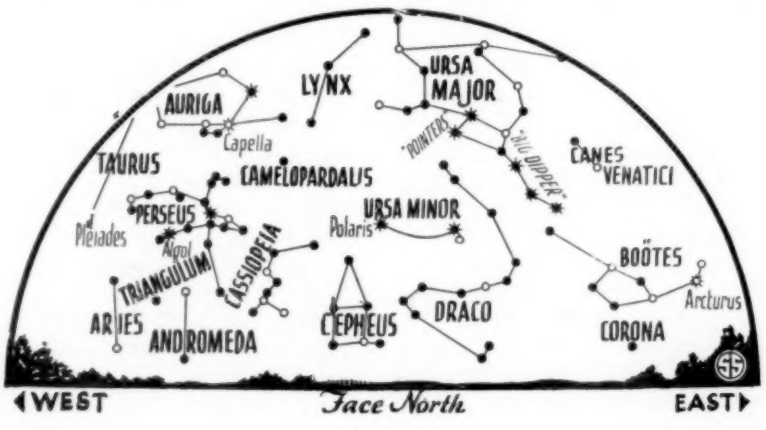
On March 21, at 2:28 a. m., eastern standard time, the sun reaches the halfway point in its northward journey. At that time it will be directly over the equator. This is the position called the vernal equinox, and has long been taken as the beginning of spring. In fact, in bygone days, people began the new year at the vernal equinox instead of on the first of January.

Another way that astronomers sometimes describe the event that marks the beginning of spring, is to say that at that time the sun enters the sign of Aries. Like Pisces, Aries is another of the constellations that mark the Zodiac, the path of the sun, the moon and the planets. It thus seems a bit confusing when one finds that at the time the sun enters the sign of Aries it is actually in Pisces. Not until the end of next month will it actually be in Aries, the ram. However, the confusion is cleared when one learns something of the history of the matter.

25,800-Year Wabble

Several thousand years ago the sun actually entered the constellation of Aries at the time of the equinox, and the path of the sun, the ecliptic, was divided into twelve parts corresponding to the twelve constellations along it. After Aries came Taurus, the Bull; Gemini, the twins; Cancer, the crab; Leo, the lion; Virgo, the virgin; Libra, the scales; Scorpius, the scorpion; Sagittarius, the archer; Capricornus, the sea-goat; Aquarius, the water carrier; and Pisces.

Among the many motions that the earth is undergoing, there is a wabbling of its axis which the astronomer calls "precession." One complete "wabble" takes 25,800 years, but during this time the celestial pole, the point in the sky directly over the earth's pole, describes a large circle. At the same time the constellations of the zodiac make a complete circuit around the ecliptic. Thus, in the time since the sign of Aries was established, that group of stars has itself moved into the next sign of Taurus, while Pisces, which was then way around at the end of the line, has moved into first place. But the signs have not changed even though the constellations have, and so we say that the beginning



of spring occurs when the sun enters the sign of Aries.

Jupiter is the only planet that can be seen this month in the evening. It is a little south of the east point, and low in the sky about 9:00 p. m. It is brighter than any star. Spica, which marks Virgo, is just below. In the early morning hours just before sunrise Venus comes into view, also in the east, and during this month it is about as brilliant as it was in the western evening sky in the early winter, even exceeding Jupiter in magnitude. In fact, it is so bright that it can easily be seen in the daytime sky, if you know just where to look.

Saturn and Mercury are between Venus and the sun, but, being much fainter, they are very difficult to see. Mars passes directly in line with the sun this month and cannot be seen at all. During the coming months, however, he will come more and more into the night sky.

"By Jiminy"

Almost overhead can be seen the very interesting constellation of Gemini, the twins. Castor and Pollux are their names, with the latter, which is the brighter, to the south. They represented favorite deities of the Romans, especially the soldiers, who thought that these twins led them on to victory. They used to swear by them, and this oath still survives, in the slightly modified form, "by jiminy." This constellation also has the distinction of having had two new major planets discovered within its borders. In March of 1781, William Herschel, then organist of the Octagon Chapel at Bath, England, and an amateur astronomer, turned his little homemade telescope towards Gemini and discovered the body which later came to be called Uranus, one of the family of planets which revolves around the sun and includes our earth. Then in January, 1930, astronomers at the Lowell Observatory, Arizona, took a photograph of this part of the sky and on one of their plates found Pluto, the most newly discovered planet.

Castor is a beautiful sight through a moderately large telescope. Instead of the single star, which it appears to the naked eye, it is then shown to be a binary, that is, a star consisting of two separate orbs which revolve around each other. Such couples are not rare, for recent studies indicate that one star in every four is so constituted. The two bodies forming Castor take about 300 years to make a complete revolution and they are so close to the earth that their light takes only 43 years to reach us. Thus they are fairly close neighbors.

Castor has another claim to interest. It was in 1750 that the English astronomer, Bradley, discovered that Castor was a double star. Modern observations have revealed a third member of the group, a very faint star which goes around much more slowly, perhaps taking as long as 10,000 years. Even this is not the whole story, because the spectroscope, with which so many great astronomical discoveries have been made, shows that each of these three stars consists of a pair of stars, so close together that no telescope is powerful enough to show them as two distinct bodies. Thus the star which appears single to the naked eye really consists of at least six separate orbs.

Phases of Moon

During March the moon is full on the first, at last quarter on the 8th, new on the 15th and at first quarter on the 22d. Thus, there will be moonlit evenings during the first few days of the month, and from about the 20th to the end of the month. On the fourth the moon passes near to Jupiter, with the planet to the north.

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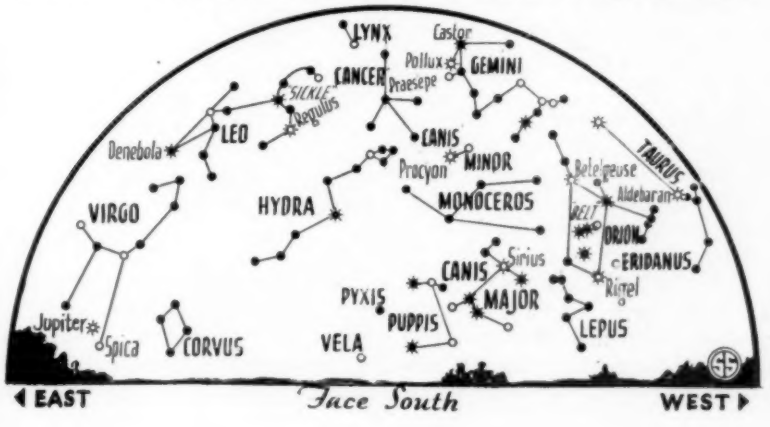
✡ ✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



PHYSICS

Shortest Radio Waves Measure Molecules

TWO University of Michigan scientists are using the shortest radio waves ever produced by radio tubes. These radio waves are less than a half inch long, as compared to the previous low of well over an inch and to the commonly used radio waves of about 1500 feet.

The waves are produced by electrical oscillations inside a tiny vacuum tube. The anodes or positive plates of the tube are made from graphite cylinders only three-tenths of an inch in diameter. The wave-length of the radio waves produced by the tube depends upon the time it takes the electrons to travel from the filament located in the center of the inner walls of the cylinder.

The whole vacuum tube is placed in a strong magnetic field, which also influences the wave-length of the waves produced. The stronger the magnetic field, the shorter the waves.

The Michigan physicists, Drs. C. E. Cleeton and N. H. Williams, measured the wave-lengths of these ultra-short radio waves by reflecting them from two brass mirrors three feet in diameter to concentrate the energy and spreading them out in a spectrum by means of a grating or set of finely ruled lines on a polished surface. The waves, after being focussed by the second mirror, fell on a crystal detector that amplified their electrical energy.

Perhaps the most striking thing about this experiment is the partial closing of the gap between the far infrared rays and the shortest radio waves. This gap has so far been the most difficult for the experimenter to close and this advance has decreased the radio waves by at least two octaves.

The production of these ultra-short waves, a feat in itself, was but a part of the accomplishment of the two physicists. The waves were passed through a rubberized cloth bag full of ammonia gas which absorbed a certain wavelength of the band of waves to an abnormal degree. From their measurements on this absorbed wave-length the scientists were able to show that the ammonia molecule has an apparent diameter of about 3½ hundred-millionths of an inch (0.000000035 inches). That is, 100,000,000 ammonia molecules in a chain would be only 3½ inches long.

Science News Letter, March 3, 1934

PHYSICS—OPTICS

New Electric Eye Has Persistence of Vision

A NON-LIVING "electrical eye" apparatus that has persistence of vision similar to that of the human eye was described by Dr. V. K. Zworykin, the RCA Victor Co. television inventor, to the American Physical Society meeting in New York. It promises aid to astronomy, biology, and other sciences as well as television.

It is an electrical latent image mechanism that stores electrically the information from an optical image projected on a mosaic of tiny cells that convert light into electricity. It can reproduce its electrically stored information when it is desired.

Persistence of vision in human seeing is important in viewing movies, for instance. It results from the ability of the eye's retina to continue to register for a fraction of a second after light has ceased to fall upon it. Dr. Zworykin has made an apparatus that improves upon the eye in several respects.

The original Zworykin device was developed as a pickup camera for television. It is part of the very promising television method that has encouraged scientists and engineers to believe that practical development of television may be "just around the corner" if people are willing to pay for it.

The new form of electrical eye is sensitive to ultraviolet rays and infrared rays or heat that are invisible to the human eye. It can allow the amplification of light intensity of the image so as to increase its intensity many times. And electrical magnification of the scene being viewed is easily accomplished.

Dr. Zworykin explained that the broad idea behind his electrical latent image apparatus is not new, but he has developed several different methods of applying the idea.

A simple electrical experiment illustrates the principle behind the Zworykin apparatus. A condenser is connected in series with a photocell. The photocell is illuminated. The light on the photocell is converted into electricity which flows and charges the condenser. The condenser is made to discharge by flashing upon it a beam of electrons shot from a cathode tube.

The simplest form of the Zworykin latent image apparatus consists of a screen placed in a vacuum bulb. The screen is a thin sheet of mica coated on the back side with a continuous metal layer. On its front there is a mosaic of small isolated photo-sensitive globules, each a miniature mechanism for changing light into electricity.

Dr. Zworykin makes this mosaic very simply by evaporating a thin film of silver upon the mica, then breaking it into separate particles by heat and sensitizing the silver with the element caesium. The globules "soak up" the light converted into electricity when an image is projected by lenses upon the screen. Each photo-sensitive globule gets a positive electrical charge in proportion to the amount of light that falls upon it.

The screen is scanned regularly by the electron beam that releases these charges and this produces changes in the electrical capacity of the metal layer on the other side of the mica. By attaching an amplifying system to that metal layer, there can be drawn off from the system a fluctuating current that is an electrical representation of the light picture on the screen.

Science News Letter, March 3, 1934

PALEONTOLOGY

15-Foot Herring Swam In Dinosaurian Seas

LENTEN regulations would have presented no difficulties to the swimming dinosaurs that ruled the seas ninety million years ago—had there been any Lent in those days. For the fish they fed on—or some of them at least—were commensurate with their own huge bulk and appetites.

Forcible demonstration of the gigantic scale on which the seas were run in those remote times is given by a fifteen-foot fossilized herring which has just been placed on display in the Peabody Museum of Yale University. It was found near Russell Springs, Kansas, in a rock deposit that was soft seabottom mud when this great fish laid him down to die nearly a million centuries ago.

Prof. Malcolm Thorpe, of the department of geology, says that this is the most complete and probably the finest extant skeleton of an ancient fish. It has 87 articulated backbone segments, and the head retains an impression of the actual skin. The great fish bears the scientific name *Portheus molossus.*

The giant fish is not lonely in his museum hall; he has been given the company of his own contemporaries. Some members of that company, indeed, might not have been very welcome to him while he was alive, for they include some of the very dinosaurs that lusted after his flesh, as well as a huge flying reptile, *Pteranodon,* with a 25-foot wingspread.

Science News Letter, March 3, 1934

METEOROLOGY

Cold Waves Follow Unusual Route

SHAKESPEARE might be appropriately invoked, in the case of the series of cold waves that have successively gripped the eastern United States during the past few weeks.

"One woe doth tread upon another's heel," recites the Bard, somewhere in Hamlet.

For the cold waves have followed a regular track, one right after the other, like the elephants holding one another's tails in a circus parade. Each successive mass of freezing air has originated somewhere in the unpeopled wastes of northern Siberia. It has moved across Alaska and northern Canada to the Hudson Bay region. Then it has swung southward, to vent its fury on New England and the Atlantic States.

This cold-wave track is quite abnormal, says J. B. Kincer of the U. S. Weather Bureau. In ordinary winters, cold waves start their southward swing much farther to the west, moving down the Great Plains area and slanting eastwardly across the country. But this winter the West has been almost basking, under relatively balmy skies. For example, the state of Montana, which ordinarily is anything but a Riviera in winter, has during recent weeks averaged eighteen degrees a day above normal winter temperatures.

Science News Letter, March 3, 1934

The Phoenicians have partly lost their reputation as pioneer sea lords since it has been found that the people of Crete spread settlements from the Aegean to Spain.

READ OVER THE SHOULDERS OF GIANTS

HOW BETTER can we read of the deeds of the great men of science than from over their shoulders as they write their own impressions of the discoveries that have built the world we live in. No matter how often or how well a story has been told there is still a fresh thrill in reading it as it was told the first time.

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TEACHERS: The pictures which illustrate most Classics of Science increase their effectiveness for classroom use. They help your students share the thrill of great discoveries.

BELIEVED HIM TO BE NIMROD

The first archaeologist to find the site of Nineveh describes the discovery of a gigantic statue in the temple gateway. (Layard, "Nineveh," SNL No. 529).

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ENTOMOLOGY

NATURE RAMBLINGS *by Frank Thone*

The Years of the Locust

NEXT SUMMER the grasshoppers are going to be bad in the Northwest, as they were last summer, and the summer before, and the summer before that. The Years of the Locust are upon us again.

The Bureau of Entomology of the U. S. Department of Agriculture has had its field men out looking over the ground, and they report that there are formidable numbers of eggs in the soil, left there by last year's 'hoppers to hatch out this spring, first as tiny creeping insects that move over the ground in crowds, then as full-grown, winged and devouring terrors that may fill the air with their clouds. No old settler who lived on the Great Plains in the early days doubts the literal accuracy of the tenth chapter of Exodus.

For our western grasshoppers are real locusts, not the same exactly as the Biblical ones, but close cousins nevertheless. There are four species of them, that make most of the trouble in the wheat belt. And by a curious inadvertence of popular naming, we have given the locust's ill repute and terror to two relatively harmless insects, for the dog-day "locust" and the seventeen-year "locust" are not locusts at all but cicadas.

Scientists long ago learned how to fight our grasshopper-locusts with considerable effectiveness, by scattering baits of arsenic-poisoned bran in the way of the creeping hordes of young insects, before they take to their wings. The state of Minnesota has reduced the depredations of the pest to minor proportions during the present locust cycle by using this method of warfare, but the less wealthy states to the west, the Dakotas and Montana, have not had the money for bran or arsenic or man-hire, so they have been caught in a vicious and ever-widening spiral of the devouring pests. If they cannot find money to carry on the war, only a cold, wet spring or some other combination of natural factors unfavorable to the locusts can save them.

The Bureau of Entomology has been cooperating with the states as far as its funds have permitted. But their already severely retrenched locust-fighting funds are threatened with still further retrenchments.

At the same time, the mild winter weather that has lain over all the West seems to be favoring these insect enemies of man. It has been somewhat drought-y, to be sure, but there seems to have been enough moisture to keep the eggs from being killed. There has been some blowing of soil, but probably not deep enough to expose the eggs in most places. And if the mild winter passes into an unusually early, warm spring, there is grave danger that the locusts will hatch and begin crawling before the poison-spreading armies can take the field against them. If that happens, no one can even guess at the consequences.

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PHYSICS

Prof. Compton Interprets Stratosphere Results

THE RECORDING cosmic-ray meter taken to an altitude of 61,243 feet on the Settle-Fordney stratosphere flight brought back a message that Prof. A. H. Compton and Dr. R. J. Stephenson of the University of Chicago interpret as meaning that cosmic rays are charged particles, not radiation like super gamma rays or X-rays.

To the American Physical Society in New York recently Dr. Compton announced this interpretation. The relationship between the ionization shown by the meter and the altitude is such that Prof. Compton does not believe that it can be explained by radiations of the gamma ray type, but it does fit in with the effects produced by alpha rays or ionizing particles with a definite range.

Science News Letter, March 3, 1934

Three species of oyster are cultivated in the United States.

AERONAUTICS—PHYSICS

Infrared Lights Declared Impractical for Fog Flying

HOPES that flying in foggy weather could be made safer by the use of infrared radiation were blasted by scientists and engineers gathered in Washington at the request of the Bureau of Aeronautics of the U. S. Department of Commerce for a conference on the problem of overcoming the hazard of fog.

There is no known source for obtaining infrared radiation of the wavelengths necessary for penetrating fog in energies of more than a few millionths of a millionth of a volt, it was pointed out by Dr. Irving Langmuir of the General Electric Research Laboratory and others in the discussion. No one knows how to produce this type of radiation in useful amounts. The discovery of a way to produce such radiation would be a stroke of genius and is not likely to occur during routine experimentation.

The scientists also discouraged Governmental experimentation with proposed schemes for dissipation of fog by use of the Tesla coil and other means. Such plans have been tested for many years, but it is well known to physicists that it is theoretically impossible for them to work well enough to be of practical use, Dr. W. J. Humphreys told the gathering. Those that are based on sound scientific principles are too expensive for use in aviation.

Two possible solutions to the problem of fog landings were, however, given sanction by the meeting, and intensive research along these lines was urged. The first aid to the fog-bound flyers will be the radio, it was suggested. It is known positively that radio will penetrate fog. And radio signals can indicate to the flyer, by the use of instruments, his location with reference to the flying field. It is true that they do not

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give distances shorter than the length of the radio wavelength used, but it is now possible to use wavelengths as short as 10 meters (10.9 yards) for this purpose. These are very good; it is not necessary to wait until one centimeter or ten centimeter wavelengths are made available.

Another aid which further research may adapt for the use of the flyer is the device used by vessels to determine the depth of the water beneath the hull by measuring the time required for a sound to return as an echo. A similar device has already been tried on airplanes but at present it is necessary for the flyer to judge from the loudness of the sound how far he is above the earth. It would be quite possible to have an instrument pick up the echo and show on a dial the height of the plane in feet above the landing field.

Science News Letter, March 3, 1934

ARCHAEOLOGY

One Child in Three Died In Ancient Indian Village

ONE BABY out of every three—this high proportion claimed by death is revealed by excavations at one prehistoric Indian village.

Excavation of the cemetery of this village, Un Shagi, is reported by Dr. George Woodbury to the American Association for the Advancement of Science. The village, which was apparently inhabited only about a hundred years in prehistoric times, lies in the Jemez Canyon, in New Mexico.

The ruins have been the scene of excavations since 1926, under direction of the School of American Research and the University of New Mexico. One-third of the cemetery has been unearthed, most of the burials being found in the refuse heap. A few infants were buried in the floors of still inhabited rooms, Dr. Woodbury said.

From his study of the 85 burials that have been found, Dr. Woodbury concluded that 36 per cent. of the village inhabitants died in infancy. He also found evidence that not more than four generations were buried in the cemetery, which means that Un Shagi had a brief career as a settlement.

Finding about twice as many female as male burials at the ruin is explained by Dr. Woodbury on the grounds that a good many of the men doubtless died while off hunting or at war and were buried elsewhere.

Science News Letter, March 3, 1934

•First Glances at New Books

Chemistry

OUT OF THE TEST TUBE—Harry N. Holmes—*Long and Smith,* 373 p., $3. The author, who is professor of chemistry at Oberlin College, has command of a literary style marked by much of Van Loon's breezy rush and impatience of detail; yet he is a real chemist after all, so that he gets his main facts on straight and even manages to present structural formulae of organic compounds in palatable form. The book is baited with many chemical wonder-facts of the "oh, my!" variety, yet each such bait pulls the reader straight into a "here's why" of fundamental scientific explanation.

Science News Letter, March 3, 1934

Physics—Industry

INDUSTRIAL RADIOGRAPHY — Ancel St. John and Herbert R. Isenburger—*Wiley,* 232 p., $3.50. X-rays have rendered such important service in medicine and to experimental physics that we are likely to forget they can be useful to industry. With much practical detail and scientific background, this treatise should prove valuable to those who wish to apply radiography by X-rays or gamma rays to industrial problems. An excellent 20-page bibliography completes the volume.

Science News Letter, March 3, 1934

Physics

COLLISION PROCESSES IN GASES—F. L. Arnot—*E. P. Dutton,* 104 p., $1.20. Written to assist those who are about to begin experimental research on problems involving the collision of electrons, photons and positive ions with atoms and molecules of a gas at low pressures, this latest addition to a useful series of monographs is divided into two parts. The first part is devoted to collisions between electrons and atoms and the other to other types of collisions.

Science News Letter, March 3, 1934

Education

A STUDY OF LIBRARY READING IN THE PRIMARY GRADES—C. DeWitt Boney—*Teachers College, Columbia Univ.,* 70 p., $1.50. One of the "Contributions to Education, No. 578."

Science News Letter, March 3, 1934

Horticulture

MODERN GUIDE TO SUCCESSFUL GARDENING—M. G. Kains—*Greenberg,* xiv+370 p., $2.50. The world is full of books about gardening, but most of them are not intended to be read, only to be "consulted," like a cyclopedia or a collection of formulas or recipes, when you want some specific bit of information or direct instruction how to accomplish a given job. Mr. Kains' book is different. It does give plenty of information, and tells how to do things, but it goes about its business in such an engagingly chatty, breezy fashion that it tempts you to sit and read it "just for fun." Which undoubtedly make its contents "slip down" easier, and sit better on the mental digestion.

Science News Letter, March 3, 1934

Botany

CACTUS — Laura Adams Armer—*Stokes,* 101 p., $1.50. The present vogue for rock gardens and desert gardens has caused a great upswing in popular interest in cacti, most characteristic of American dry-land plants, yet among the strangest of all vegetables. The present book is one of the most attractive of all recent cactus literature, presenting in chatty yet accurate form the principal facts about the most outstanding species, and illustrating each with an excellent full-page pen drawing by Sidney Armer.

Science News Letter, March 3, 1934

Nature Study

STORIES OF OUTDOOR SCIENCE—Lewis M. Dougan—*Lyons and Carnahan,* xi+357 p., 80c. A well planned, well written, well illustrated textbook of general outdoor science, particularly as seen and experienced in the Mississippi valley.

Science News Letter, March 3, 1934

Psychology

EDUCATIONAL PSYCHOLOGY — William A. Kelly—*Bruce,* 501 p., $2.40. A text intended for use in Catholic schools and colleges. Chapters on the "Soul," the "Will," and "Character Formation" emphasize the spiritual and moral training of the child.

Science News Letter, March 3, 1934

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